



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,485	06/02/2006	Jean Dijon	291388US2PCT	3587
22850	7590	01/07/2009	EXAMINER	
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			WON, BUMSUK	
			ART UNIT	PAPER NUMBER
			2889	
			NOTIFICATION DATE	DELIVERY MODE
			01/07/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No.	Applicant(s)	
	10/581,485	DIJON ET AL.	
	Examiner	Art Unit	
	BUMSUK WON	2889	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/2/2006, 4/13/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claims 54 and 55 are objected to because of the following informalities: the last word "gate" should be "gate layer". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 46 and 49-64 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 46 recites the limitation "the second insulating layer" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 49 recites the limitation "the layer" in line 5. There is insufficient antecedent basis for this limitation in the claim. Claims 50-64 are rejected due to claim dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2889

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 30, 32-38, 40, 43-45, 48, 49, 52-55, 57-60 and 64 are rejected under 35 U.S.C. 102(b) as being anticipated by Xu (US 5,973,444) which is cited in the IDS.

Regarding claim 30, Xu discloses a field emission device (figure 9A), comprising: a cathode (201); a porous insulating layer (205) includes open zones (206), which are pores of the layer (205); a conductive layer (204) as a gate layer, including at least one layer of catalyst material (column 5, lines 9-23) for forming electron emitters (203) and at least one layer of a conductive material (column 5, lines 9-23) not catalyzing formation of electron emitters (203); and electron emitters (203) in the open zones of the insulating layer and the gate layer (figure 9A).

Regarding claim 32, Xu discloses the electron emitters are constituted by nanofibers (column 7, line 31).

Regarding claim 33, Xu discloses the electron emitters are made of carbon (column 7, line 31).

Regarding claim 34, Xu discloses the electron emitters are made of a metallic material (column 2, lines 7-12).

Regarding claim 35, Xu discloses the electron emitters are made of molybdenum (column 2, lines 7-12).

Regarding claim 36, Xu discloses the electron emitters are made of an emitting semiconductor material (column 2, lines 7-12).

Regarding claim 37, Xu discloses the electron emitters are made of silicon (column 2, lines 7-12).

Regarding claim 38, Xu discloses the insulating layer is made of alumina (column 7, line 56).

Regarding claim 40, Xu discloses a method for producing a field emission device (figure 9A), comprising: forming a cathode (201); forming a porous insulating layer (205), including open zones (206) that are pores in the layer (205); forming a conductive layer (204), as a gate layer, including at least one layer of catalyst material (column 5, lines 9-23) for forming electron emitters (203) and at least one layer of a conductive material (column 5, lines 9-23) not catalyzing formation of electron emitters (203); and forming electron emitters (203) in the open zones of the insulating layer and the gate layer (figure 9A).

Regarding claim 43, Xu discloses the electron emitters are constituted by nanofibers (column 7, line 31).

Regarding claim 44, Xu discloses the electron emitters are made of carbon (column 7, line 31).

Regarding claim 45, Xu discloses the electron emitters are obtained by electrochemical deposition of an emitting metal (column 21, lines 9-29).

Regarding claim 48, Xu discloses the catalyst is made of nickel.

Regarding claim 49, Xu discloses a method for producing a field emission device (figures 8A-9A), comprising: forming a cathode (152/201); forming a first insulating porous layer (151/205), and then a gate layer (153/204); forming a second insulating porous layer (160/164) and open zones (162) in the second insulating layer, the open zones being pores of the layer (160/164); etching the gate layer and the first insulating

Art Unit: 2889

layer, through the open zones of the first insulating layer (column 12, lines 7-26); and forming electron emitters (172/203), on catalyst zones (168), exposed at a base of the etched zones of the first insulating layer (151).

Regarding claim 52, Xu discloses depositing a catalyst material (168) after etching the gate layer (153) and the first insulating layer (151) (figures 8A-8D).

Regarding claim 53, Xu discloses removing the second insulting layer (160/164) after depositing the catalyst material (168) (figures 8A-8D).

Regarding claim 54, Xu discloses removing the second insulating layer (figures 7A-7D, 124) before depositing the catalyst material (134), then depositing the catalyst material (134) in the etched zones (125) of the first insulating layer (121) and on the non etched zones of the gate layer (123).

Regarding claim 55, Xu discloses forming a metallic layer (168) on the catalyst layer (166) deposited on the gate layer (153).

Regarding claim 57, Xu discloses the electron emitters are constituted by nanofibers (column 7, line 31).

Regarding claim 58, Xu discloses the nanotubes are obtained by pure catalytic growth (column 5, lines 9-23).

Regarding claim 59, Xu discloses the electron emitters are made of carbon (column 7, line 31).

Regarding claim 60, Xu discloses the electron emitters are obtained by electrochemical deposition of an emitting metal (column 21, lines 9-29).

Regarding claim 64, Xu discloses the catalyst is made of nickel.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 31, 39, 41, 42, 46, 56, 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu in view of Iwasaki (US 2001/0028872).

Regarding claim 31, Xu discloses all the claimed limitation except for a resistive layer arranged between the cathode and the insulating layer.

Iwasaki discloses a field emissive device (figure 3B) having a resistive layer (36) between a cathode (34) and an insulating layer (32), for the purpose of protecting the emitters.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a resistive layer between a cathode and an insulating layer as disclosed by Iwasaki in the device disclosed by Xu, for the purpose of protecting the emitters.

Regarding claim 39, Iwasaki discloses the open zones are between 5 to 25 nm (paragraph 7). The reason for combining is same as claim 31.

Regarding claim 41, Xu discloses all the claimed limitation except for a resistive layer arranged between the cathode and the insulating layer.

Art Unit: 2889

Iwasaki discloses a field emissive device (figure 3B) having a resistive layer (36) between a cathode (34) and an insulating layer (32), for the purpose of protecting the emitters.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a resistive layer between a cathode and an insulating layer as disclosed by Iwasaki in the method disclosed by Xu, for the purpose of protecting the emitters.

Regarding claim 42, Xu in view of Iwasaki discloses all the claimed limitations except for the resistive layer is made of amorphous silicon.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use amorphous silicon in the method disclosed by Xu in view of Iwasaki, for the purpose of reducing manufacturing cost.

Regarding claim 46, Iwasaki discloses the insulating layer is produced from an aluminum layer (paragraph 57). The reason for combining is same as claim 41.

Regarding claim 56, Xu discloses all the claimed limitation except for a resistive layer arranged between the cathode and the insulating layer.

Iwasaki discloses a field emissive device (figure 3B) having a resistive layer (36) between a cathode (34) and an insulating layer (32), for the purpose of protecting the emitters.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a resistive layer between a cathode and an

Art Unit: 2889

insulating layer as disclosed by Iwasaki in the method disclosed by Xu, for the purpose of protecting the emitters.

Regarding claim 61, Iwasaki discloses the insulating layer is produced from an aluminum layer (paragraph 57). The reason for combining is same as claim 56.

Regarding claim 62, Iwasaki discloses the open zones or the pores are produced by anodization of the aluminum layer (paragraph 57). The reason for combining is same as claim 56.

Claims 47 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu in view of Takeuchi (US 2005/0073261).

Regarding claim 47, Xu discloses all the claimed limitations except for the cathode is made of titanium nitride (TiN), molybdenum, chromium, or tantalum nitride (TaN).

Takeuchi discloses a device having a cathode made of molybdenum (paragraph 136), for the purpose of resisting high temperature during operation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a cathode made of molybdenum as disclosed by Takeuchi in the device disclosed by Xu, for the purpose of resisting high temperature during operation.

Regarding claim 63, Xu discloses all the claimed limitations except for the cathode is made of titanium nitride (TiN), molybdenum, chromium, or tantalum nitride (TaN).

Takeuchi discloses a method of producing a device having a cathode made of molybdenum (paragraph 136), for the purpose of resisting high temperature during operation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a cathode made of molybdenum as disclosed by Takeuchi in the method disclosed by Xu, for the purpose of resisting high temperature during operation.

Claims 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu.

Regarding claim 50, Xu discloses all the claimed limitations except for forming a catalyst layer prior to the forming of the insulating layer.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a catalyst layer prior to forming of the insulating layer in the method disclosed by Xu, for the purpose of having catalyst layer formed in a homogenous manner throughout the surface of the cathode.

Regarding claim 51, Xu discloses removing the second insulating layer (figure 8C) before the forming of the electron emitters (figure 8D).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BUMSUK WON whose telephone number is (571)272-2713. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:00 pm.

Art Unit: 2889

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minh Toan Ton can be reached on 571-272-2303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bumsuk Won/
Examiner, Art Unit 2889